## SEQUENCE LISTING



COPY OF PAPERS ORIGINALLY FILED

<110> Ferrick, David A. Swift, Susan E. Armstrong, Randall Fox, Bryan

<120> Methods and Compositions for Screening for Modulators and Ige Syntheses Secretion and Switch Rearrangement

<130> A-66038-4/RMS/JJD/DLR

<140> US 09/966,976

<141> 2001-09-27

<150> US 09/076,624

<151> 1998-05-12

<160> 19

<170> PatentIn version 3.1

<210> 1

<211> 603

<212> DNA

<213> Homo sapiens

<400> 1

ctcgaggaca gtgacctggg agtgagtaca aggtgaggcc accactcagg gtgccagctc 60 caagegggte acagggacga gggetgegge catcaggagg ceetgeacac acatetggga 120 cacgegeece egaggeeag tteaceteag tgegeeteat teteetgeae aaaagegeee 180 ccatcctttc ttcacaaggc tttcgtggaa gcagaggcgt cgatgcccag taccctctcc 240 300 ctttcccagg caacgggacc ccaagtttgc tgactgggac caccaagcca cgcatgcgtc 360 cctccccaq cacteggtgt gcateggtag tgaaggagcc tcacctgacc cccgctgttg 420 ctcaatcqac ttcccaagaa cagagagaaa agggaacttc cagggcggcc cgggcctcct 480 gggggttccc accccatttt tagctgaaag cactgaggca gagctccccc tacccaggct 540 ccactgcccg gcacagaaat aacaaccacg gttactgatc atctgggagc tgtccaggaa 603 ttc

<210> 2

<211> 143

<212> DNA

<213> Artificial sequence

<220>

	ynthetic					
<400> 2 gctgggct	aa actgggctag	cctgagctgg	gctgaactgg	gctgctgggc	tggactgggt	60
aagctggg	ct gagctgggtt	gggtggaaat	gggctgagct	gagctaggct	aaactgggtt	120
tggctggg	ct gggctgggct	aaa				143
<210> 3						
<211> 7	5					
	NA rtificial seq	uence			٠	
<220>						•
<223> s	ynthetic					
<400> 3						
ggtttggc	tg ggctgggctg	ggctgggctg	ggttcagctg	agcgggttgg	gttagactgg	60
gtcaaact	gg ttcagc	•				76
<210> 4 <211> 63	219					
	NA ctificial sequ	lence				
(213) W	crirciar sed	rence				
<220> <223> sy	nthetic					
	nthetic					
<223> sy	mthetic gc cctttcgtct		ctttgctctt	aggagtttcc	taatacatcc	60
<223> sy <400> 4 atcacgagg		tcaagaacag				60 120
<223> sy <400> 4 atcacgagg caaactcaa	ge cetttegtet	tcaagaacag atttgacttg	ttctatgccc	tagttattaa	tagtaatcaa	
<223> system <400> 4 atcacgagggggggggggggggggggggggggggggggg	gc cctttcgtct aa tatataaagc	tcaagaacag atttgacttg agcccatata	ttetatgece	tagttattaa cgttacataa	tagtaatcaa cttacggtaa	120
<223> system of the control of the c	ge cetttegtet  aa tatataaage  ce attagtteat	tcaagaacag atttgacttg agcccatata cccaacgacc	ttctatgccc tggagttccg cccgcccatt	tagttattaa cgttacataa gacgtcaata	tagtaatcaa cttacggtaa atgacgtatg	120 180
<223> system of the control of the c	ge cetttegtet aa tatataaage ce attagtteat ce tggetgaeeg	tcaagaacag atttgacttg agcccatata cccaacgacc gggactttcc	ttctatgccc tggagttccg cccgcccatt attgacgtca	tagttattaa cgttacataa gacgtcaata atgggtggag	tagtaatcaa cttacggtaa atgacgtatg tatttacggt	120 180 240
<223> system of the control of the c	gc cctttcgtct aa tatataaagc cc attagttcat cc tggctgaccg gt aacgccaata	tcaagaacag atttgacttg agcccatata cccaacgacc gggactttcc catcaagtgt	ttctatgccc tggagttccg cccgcccatt attgacgtca atcatatgcc	tagttattaa cgttacataa gacgtcaata atgggtggag aagtacgccc	tagtaatcaa cttacggtaa atgacgtatg tatttacggt cctattgacg	120 180 240 300
<223> system <223> system <200> 4 atcacgagggggggggggggggggggggggggggggggg	ge cetttegtet aa tatataaage ce attagtteat ce tggetgaeeg gt aaegeeaata ca ettggeagta	tcaagaacag atttgacttg agcccatata cccaacgacc gggactttcc catcaagtgt gcctggcatt	ttctatgccc tggagttccg cccgcccatt attgacgtca atcatatgcc atgcccagta	tagttattaa cgttacataa gacgtcaata atgggtggag aagtacgccc catgacctta	tagtaatcaa cttacggtaa atgacgtatg tatttacggt cctattgacg tgggactttc	120 180 240 300 360
<223> system <223> system <200> 4 atcacgagggggggggggggggggggggggggggggggg	ge cetttegtet aa tatataaage te attagtteat ee tggetgaeeg gt aaegeeaata ea ettggeagta gg taaatggeee	tcaagaacag atttgacttg agcccatata cccaacgacc gggactttcc catcaagtgt gcctggcatt gtattagtca	ttctatgccc tggagttccg cccgcccatt attgacgtca atcatatgcc atgcccagta tcgctattac	tagttattaa cgttacataa gacgtcaata atgggtggag aagtacgccc catgacctta catggtgatg	tagtaatcaa cttacggtaa atgacgtatg tatttacggt cctattgacg tgggactttc cggttttggc	120 180 240 300 360 420
<223> system <223> system <200> 4 atcacgagggggggggggggggggggggggggggggggg	ge cetttegtet aa tatataaage ac attagtteat ee tggetgaeeg gt aaegeeaata ea ettggeagta gg taaatggeee ea gtacatetae	tcaagaacag atttgacttg agcccatata cccaacgacc gggactttcc catcaagtgt gcctggcatt gtattagtca tagcggtttg	ttctatgccc tggagttccg cccgcccatt attgacgtca atcatatgcc atgcccagta tcgctattac actcacgggg	tagttattaa cgttacataa gacgtcaata atgggtggag aagtacgccc catgacctta catggtgatg atttccaagt	tagtaatcaa cttacggtaa atgacgtatg tatttacggt cctattgacg tgggactttc cggttttggc ctccacccca	120 180 240 300 360 420 480
<223> system <223> system <200> 4 atcacgagggggggggggggggggggggggggggggggg	ge cetttegtet aa tatataaage te attagtteat ee tggetgaeeg gt aaegeeaata ea ettggeagta gg taaatggeee ea gtacatetae aa tgggegtgga	tcaagaacag atttgacttg agcccatata cccaacgacc gggactttcc catcaagtgt gcctggcatt gtattagtca tagcggtttg ttttggcacc	ttctatgccc tggagttccg cccgcccatt attgacgtca atcatatgcc atgcccagta tcgctattac actcacgggg aaaatcaacg	tagttattaa cgttacataa gacgtcaata atgggtggag aagtacgccc catgacctta catggtgatg atttccaagt ggactttcca	tagtaatcaa cttacggtaa atgacgtatg tatttacggt cctattgacg tgggactttc cggttttggc ctccacccca aaatgtcgta	120 180 240 300 360 420 480 540

780 gagtegeeeg ggtaceegtg tatecaataa accetettge agttgcatee gaettgtggt 840 ctegetgtte ettgggaggg teteetetga gtgattgaet accegteage gggggtettt 900 catttggggg ctcgtccggg atcgggagac ccctgcccag ggaccaccga cccaccaccg 960 ggaggtaagc tggccagcaa cttatctgtg tctgtccgat tgtctagtgt ctatgactga 1020 ttttatgege etgegteggt actagttage taactagete tgtatetgge ggaceegtgg tggaactgac gagttcggaa cacccggccg caaccctggg agacgtccca gggacttcgg - 1080 gggccgtttt tgtggcccga cctgagtcca aaaatcccga tcgttttgga ctctttggtg 1140 caccccctt agaggaggga tatgtggttc tggtaggaga cgagaaccta aaacagttcc 1200 egecteegte tgaatttttg ettteggttt gggacegaag eegegeegeg egtettgtet 1260 gctgcagcat cgttctgtgt tgtctctgtc tgactgtgtt tctgtatttg tctgaaaata 1320 tcggcccggg ccagactgtt accactccct taagtttgac cttaggtcac tggaaagatg 1380 tegageggat egeteacaac eagteggtag atgteaagaa gagaegttgg gttacettet 1440 gctctgcaga atggccaacc tttaacgtcg gatggccgcg agacggcacc tttaaccgag 1500 acctcatcac ccaggttaag atcaaggtct tttcacctgg cccgcatgga cacccagacc 1560 aggtccccta catcgtgacc tgggaagcct tggcttttga ccccctccc tgggtcaagc 1620 cettigtaca ecetaageet cogeeteete tteeteeate egeecegtet eteeceetig 1680 aaceteeteg ttegaeeeeg cetegateet eeetttatee ageeeteaet eettetetag 1740 gegeceecat atggecatat gagatettat atggggeace eeegeeett gtaaaettee 1800 1860 ctgaccetga catgacaaga gttactaaca geceetetet ecaageteae ttacaggete tetaettagt ceageaegaa gtetggagae etetggegge ageetaeeaa gaacaaetgg 1920 accgaccggt ggtacctcac ccttaccgag tcggcgacac agtgtgggtc cgccgacacc 1980 agactaagaa cctagaacct cgctggaaag gaccttacac agtcctgctg accaccccca 2040 ccgccctcaa agtagacggc atcgcgcttg gatacacgcc gcccacgtga aggctgccga 2100 ccccgggggt ggaccatcct ctagactgcc ggatctcgag ggatccacca ccatggaccc 2160 ccattaaatt ggaattcctg cagcccgggg gatccactag ttctagagcg aattaattcc 2220 ggttattttc caccatattg ccgtcttttg gcaatgtgag ggcccggaaa cctggccctg 2280 tettettgae gageatteet aggggtettt cecetetege caaaggaatg caaggtetgt 2340 tgaatgtcgt gaaggaagca gttcctctgg aagcttcttg aagacaaaca acgtctgtag 2400 cgaccetttg caggcagegg aaccececae etggcgacag gtgcetetge ggccaaaaage 2460

2520 cacgtgtata agatacacct gcaaaggcgg cacaacccca gtgccacgtt gtgagttgga 2580 tagttgtgga aagagtcaaa tggctctcct caagcgtatt caacaagggg ctgaaggatg 2640 eccagaaggt accecattgt atgggatetg atetggggee teggtgeaca tgetttacat 2700 gtgtttagtc gaggttaaaa aacgtctagg ccccccgaac cacggggacg tggttttcct ttgaaaaaca cgatgataat atgggggatc caccggtcgc caccatggtg agcaagggcg 2760 2820 aggagetgtt caceggggtg gtgeecatee tggtegaget ggaeggegae gtaaaeggee 2880 acaagttcag cgtgtccggc gagggcgagg gcgatgccac ctacggcaag ctgaccctga agtteatetg caccacegge aagetgeeeg tgeeetggee caccetegtg accaccetga 2940 ectaeggegt geagtgette ageegetaee eegaeeacat gaageageae gaettettea 3000 3060 agteegeeat geeegaagge taegteeagg agegeaceat ettetteaag gaegaeggea actacaagac ccgcgccgag gtgaagttcg agggcgacac cctggtgaac cgcatcgagc 3120 tgaagggcat cgacttcaag gaggacggca acatcctggg gcacaagctg gagtacaact 3180 3240 acaacagcca caacgtctat atcatggccg acaagcagaa gaacggcatc aaggtgaact tcaagatccg ccacaacatc gaggacggca gcgtgcagct cgccgaccac taccagcaga .3300 3360 acacccccat eggegaegge ecegtgetge tgeeegacaa ecactacetg ageaeceagt 3420 cegecetgag caaagacece aacgagaage gegateacat ggteetgetg gagttegtga ccgccgccgg gatcactctc ggcatggacg agctgtacaa gtaaagcggc cgctcgacga 3480 taaaataaaa gattttattt agtctccaga aaaagggggg aatgaaagac cccacctgta 3540 3600 ggtttggcaa gctagcttaa gtaacgccat tttgcaaggc atggaaaaat acataactga 3660 gaatagagaa gttcagatca aggtcaggaa cagatggaac agctgaatat gggccaaaca 3720 ggatatetgt ggtaageagt teetgeeeeg geteagggee aagaacagat ggaacagetg aatatgggcc aaacaggata tctgtggtaa gcagttcctg ccccggctca gggccaagaa 3780 cagatggtcc ccagatgcgg tccagccctc agcagtttct agagaaccat cagatgtttc 3840 cagggtgccc caaggacctg aaatgaccct gtgccttatt tgaactaacc aatcagttcg 3900 ettetegett etgttegege gettetgete eeegagetea ataaaagage eeacaaceee 3960 teactegggg egecagteet eegattgact gagtegeeeg ggtaceegtg tatecaataa 4020 accetettge agttgcatee gaettgtggt etegetgtte ettgggaggg teteetetga 4080 gtgattgact acceptegeg ggggtettte attteegact tgtggteteg etgeettggg 4140

4200 agggteteet etgagtgatt gaetaceegt cagegggggt etteacatge ageatgtate aaaattaatt tggttttttt tcttaagtat ttacattaaa tggccatagt tgcattaatg 4260 aateggeeaa egegegggga gaggeggttt gegtattgge getetteege tteetegete 4320 actgactege tgegeteggt egtteggetg eggegagegg tateagetea etcaaaggeg 4380 gtaatacggt tatccacaga atcaggggat aacgcaggaa agaacatgtg agcaaaaggc 4440 cagcaaaagg ccaggaaccg taaaaaggcc gcgttgctgg cgtttttcca taggctccgc 4500 eccectgaeg ageateacaa aaategaege teaagteaga ggtggegaaa eeegaeagga 4560 ctataaagat accaggegtt teeecetgga ageteeeteg tgegetetee tgtteegace 4620 etgeegetta eeggataeet gteegeettt eteeettegg gaagegtgge gettteteat 4680 agctcacgct gtaggtatct cagttcggtg taggtcgttc gctccaagct gggctgtgtg 4740 cacgaacccc ccgttcagcc cgaccgctgc gccttatccg gtaactatcg tcttgagtcc 4800 4860 aacceggtaa gacacgactt ategecactg geageageca etggtaacag gattageaga gcgaggtatg taggcggtgc tacagagttc ttgaagtggt ggcctaacta cggctacact 4920 4980 agaaggacag tatttggtat ctgcgctctg ctgaagccag ttaccttcgg aaaaagagtt ggtagctett gateeggeaa acaaaceaee getggtageg gtggtttttt tgtttgeaag 5040 cagcagatta cgcgcagaaa aaaaggatct caagaagatc ctttgatctt ttctacgggg 5100 5160 tctgacgctc agtggaacga aaactcacgt taagggattt tggtcatgag attatcaaaa aggatettea eetagateet tttaaattaa aaatgaagtt tgegeaaate aatetaaagt 5220 atatatgagt aaacttggtc tgacagttac caatgcttaa tcagtgaggc acctatctca 5280 gegatetgte tatttegtte atceatagtt geetgactee eegtegtgta gataactaeg 5340 atacgggagg gcttaccatc tggccccagt gctgcaatga taccgcgaga cccacgctca 5400 ceggetecag atttateage aataaaceag eeageeggaa gggeegageg eagaagtggt 5460 cctgcaactt tatccgcctc catccagtct attaattgtt gccgggaagc tagagtaagt 5520 agttcgccag ttaatagttt gcgcaacgtt gttgccattg ctacaggcat cgtggtgtca 5580 egetegtegt ttggtatgge tteatteage teeggtteee aacgateaag gegagttaca 5640 tgatccccca tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat cgttgtcaga 5700 agtaagttgg ccgcagtgtt atcactcatg gttatggcag cactgcataa ttctcttact 5760 gtcatgccat ccgtaagatg cttttctgtg actggtgagt actcaaccaa gtcattctga 5820 gaatagtgta tgcggcgacc gagttgctct tgcccggcgt caacacggga taataccgcg 5880

ccacatagca gaactttaaa agtgctcatc attggaaaac gttcttcggg gcgaaaactc 5940
tcaaggatct taccgctgtt gagatccagt tcgatgtaac ccactcgtgc acccaactga 6000
tcttcagcat cttttacttt caccagcgtt tctgggtgag caaaaacagg aaggcaaaat 6060
gccgcaaaaa agggaataag ggcgacacgg aaatgttgaa tactcatact cttccttttt 6120
caatattatt gaagcattta tcaggttatt gtctcatgag cggatacata tttgaatgta 6180
tttagaaaaa taaacaaata ggggttccgc gcacatttc 6219

<210> 5

<211> 5713

<212> DNA

<213> Artificial sequence

<220>

<400> 5

<223> synthetic

atcacgaggc cctttcgtct tcaagaacag ctttgctctt aggagtttcc taatacatcc 60 caaactcaaa tatataaagc atttgacttg ttctatgccc tagttattaa tagtaatcaa 120 ttacggggtc attagttcat agcccatata tggagttccg cgttacataa cttacggtaa 180 atggcccgcc tggctgaccg cccaacgacc cccgcccatt gacgtcaata atgacgtatg 240 ttcccatagt aacgccaata gggactttcc attgacgtca atgggtggag tatttacggt 300 aaactgccca cttggcagta catcaagtgt atcatatgcc aagtacgccc cctattgacg 360 tcaatgacgg taaatggccc gcctggcatt atgcccagta catgacctta tgggactttc .420 ctacttggca gtacatctac gtattagtca tcgctattac catggtgatg cggttttggc 480 agtacatcaa tgggcgtgga tagcggtttg actcacgggg atttccaagt ctccacccca 540 ttgacgtcaa tgggagtttg ttttggcacc aaaatcaacg ggactttcca aaatgtcgta 600 acaactcege eccattgaeg caaatgggeg gtaggeatgt aeggtgggag gtetatataa 660 gcagagetea ataaaagage ecacaaceee teactegggg egecagteet eegattgaet 720 gagtcgcccg ggtacccgtg tatccaataa accctcttgc agttgcatcc gacttgtggt 780 ctegetgtte ettgggaggg teteetetga gtgattgaet accegteage gggggtettt 840 catttggggg ctcgtccggg atcgggagac ccctgcccag ggaccaccga cccaccaccg 900

ggaggtaage tggccagcaa ettatetgtg tetgteegat tgtetagtgt etatgaetga

ttttatgege etgegteggt actagttage taactagete tgtatetgge ggaceegtgg

960

tggaactgac gagtteggaa cacceggeeg caaccetggg agaegteeca gggaettegg 1080 gggccgtttt tgtggcccga cctgagtcca aaaatcccga tcgttttgga ctctttggtg 1140 1200 caccccctt agaggaggga tatgtggttc tggtaggaga cgagaaccta aaacagttcc egecteegte tgaatttttg ettteggttt gggacegaag eegegeegeg egtettgtet 1260 getgeageat egttetgtgt tgtetetgte tgaetgtgtt tetgtatttg tetgaaaata 1320 teggeceggg ccagactgtt accaetecet taagtttgae ettaggteae tggaaagatg 1380 tegageggat egeteaeaae eagteggtag atgteaagaa gagaegttgg gttaeettet 1440 getetgeaga atggeeaace tttaaegteg gatggeegeg agaeggeace tttaaeegag 1500 acctcatcac ccaggttaag atcaaggtct tttcacctgg cccgcatgga cacccagacc 1560 aggtccccta catcgtgacc tgggaagcct tggcttttga ccccctccc tgggtcaagc 1620 cettigtaca ccetaageet cegecteete tteeteeate egeceegtet etececettg 1680 aaceteeteg ttegaceeeg cetegateet ecetttatee ageeeteact eettetetag 1740 gegececcat atggecatat gagatettat atggggeace ecegeceett gtaaaettee 1800 ctgaccetga catgacaaga gttactaaca gcccctctct ccaagetcac ttacaggetc 1860 tetaettagt ecageaegaa gtetggagae etetggegge ageetaeeaa gaacaaetgg 1920 acegaceggt ggtaceteae cettacegag teggegacae agtgtgggte egeegacaee 1980 agactaagaa cctagaacct cgctggaaag gaccttacac agtcctgctg accaccccca 2040 cegeceteaa gtagaeggea tegeagettg gatacaegee geecaegtga aggetgeega 2100 eccegggggt ggaccatect ctagactgcc ggatetegag ggatecacea tggtgageaa 2160 gggcgaggag ctgttcaccg gggtggtgcc catcctggtc gagctggacg gcgacgtaaa 2220 2280 eggeeacaag tteagegtgt eeggegaggg egagggegat geeacetaeg geaagetgae cctgaagttc atctgcacca ccggcaagct gcccgtgccc tggcccaccc tcgtgaccac 2340 cctgacctac ggcgtgcagt gcttcagccg ctaccccgac cacatgaagc agcacgactt 2400 cttcaagtcc gccatgcccg aaggctacgt ccaggagcgc accatcttct tcaaggacga 2460 eggeaactae aagaeeegeg eegaggtgaa gttegaggge gacaeeetgg tgaacegeat 2520 cgagctgaag ggcatcgact tcaaggagga cggcaacatc ctgggggcaca agctggagta 2580 caactacaac agccacaacg tctatatcat ggccgacaag cagaagaacg gcatcaaggt 2640 gaacttcaag atcogccaca acatcgagga cggcagcgtg cagctcgccg accactacca 2700 gcagaacacc cccatcggcg acggccccgt gctgctgccc gacaaccact acctgagcac 2760

2820 ccagtccgcc ctgagcaaag accccaacga gaagcgcgat cacatggtcc tgctggagtt cgtgaccgcc gccgggatca ctctcggcat ggacgagctg tacaaggaat tcggaggtgg 2880 2940 cageggtggc ggtcagctgt tgaattttga ccttcttaaa cttgcgggag acgtcgagtc caaccetggg cecaccacca ceatggaage ttecattaaa ttggttaacg tegacgegge 3000 3060 cgctcgacga taaaataaaa gattttattt agtctccaga aaaagggggg aatgaaagac cccacctgta ggtttggcaa gctagcttaa gtaacgccat tttgcaaggc atggaaaaat 3120 acataactga gaatagagaa gttcagatca aggtcaggaa cagatggaac agctgaatat 3180 gggccaaaca ggatatetgt ggtaagcagt teetgeeeeg geteagggee aagaacagat 3240 3300 ggaacagctg aatatgggcc aaacaggata tctgtggtaa gcagttcctg ccccggctca gggccaagaa cagatggtcc ccagatgcgg tccagccctc agcagtttct agagaaccat 3360 3420 cagatgtttc cagggtgccc caaggacctg aaatgaccct gtgccttatt tgaactaacc aatcagttcg cttctcgctt ctgttcgcgc gcttctgctc cccgagctca ataaaagagc 3480 3540 ccacaaccc tcactegggg egecagteet cegattgact gagtegeeeg ggtaccegtg 3600 tatccaataa accetettge agttgcatee gacttgtggt etegetgtte ettgggaggg 3660 tetectetga gtgattgact accegteage gggggtettt cattteegae ttgtggtete 3720 getgeettgg gagggtetee tetgagtgat tgactaceeg teageggggg tetteacatg 3780 cagcatgtat caaaattaat ttggtttttt ttcttaagta tttacattaa atggccatag ttgcattaat gaatcggcca acgcgcgggg agaggcggtt tgcgtattgg cgctcttccg 3840 3900 ettecteget caetgacteg etgegetegg tegttegget geggegageg gtateagete 3960 actcaaaggc ggtaatacgg ttatccacag aatcagggga taacgcagga aagaacatgt gagcaaaagg ccagcaaaag gccaggaacc gtaaaaaggc cgcgttgctg gcgtttttcc 4020 4080 ataggeteeg eeceetgae gageateaca aaaategaeg eteaagteag aggtggegaa accegacagg actataagat accaggegtt tececetgga ageteeeteg tgegetetee 4140 tgttccgacc ctgccgctta ccggatacct gtccgccttt ctcccttcgg gaagcgtggc 4200 gettteteat ageteaeget gtaggtatet eagtteggtg taggtegtte geteeaaget 4260 4320 gggctgtgtg cacgaacccc ccgttcagcc cgaccgctgc gccttatccg gtaactatcg 4380 tettgagtee aacceggtaa gacacgactt ategecactg geageageea etggtaacag gattagcaga gcgaggtatg taggcggtgc tacagagttc ttgaagtggt ggcctaacta 4440

4500 cggctacact agaaggacag tatttggtat ctgcgctctg ctgaagccag ttaccttcgg 4560 aaaaagagtt ggtagctctt gatccggcaa acaaaccacc gctggtagcg gtggtttttt 4620 tgtttgcaag cagcagatta cgcgcagaaa aaaaggatct caagaagatc ctttgatctt 4680 ttctacgggg tctgacgctc agtggaacga aaactcacgt taagggattt tggtcatgag 4740 attatcaaaa aggatettea eetagateet tttaaattaa aaatgaagtt tgegeaaate aatctaaagt atatatgagt aaacttggtc tgacagttac caatgcttaa tcagtgaggc 4800 acctatctca gcgatctgtc tatttcgttc atccatagtt gcctgactcc ccgtcgtgta 4860 gataactacg atacgggagg gcttaccatc tggccccagt gctgcaatga taccgcgaga 4920 cccacgctca ccggctccag atttatcagc aataaaccag ccagccggaa gggccgagcg 4980 5040 cagaagtggt cctgcaactt tatccgcctc catccagtct attaattgtt gccgggaagc 5100 tagagtaagt agttcgccag ttaatagttt gcgcaacgtt gttgccattg ctacaggcat 5160 cgtggtgtca cgctcgtcgt ttggtatggc ttcattcagc tccggttccc aacgatcaag gcgagttaca tgatccccca tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat 5220 cgttgtcaga agtaagttgg ccgcagtgtt atcactcatg gttatggcag cactgcataa 5280 ttctcttact gtcatgccat ccgtaagatg cttttctgtg actggtgagt actcaaccaa 5340 gtcattctga gaatagtgta tgcggcgacc gagttgctct tgcccggcgt caacacggga 5400 taataccgcg ccacatagca gaactttaaa agtgctcatc attggaaaac gttcttcggg 5460 gegaaaacte teaaggatet tacegetgtt gagatecagt tegatgtaac ceactegtge 5520 5580 acccaactga tettcagcat ettttaettt caccagegtt tetgggtgag caaaaacagg aaggcaaaat gccgcaaaaa agggaataag ggcgacacgg aaatgttgaa tactcatact 5640 5700 cttccttttt caatattatt gaagcattta tcagggttat tgtctcatga cattaaccta 5713 taaaaatagg cgt

<210> 6

<211> 4922

<212> DNA

<213> Artificial sequence

<220>

<223> synthetic

<400> 6

atcacgaggc cetttegtet teaagaacag etttgetett aggagtttee taatacatee 60 caaactcaaa tatataaage atttgacttg ttetatgeee tagttattaa tagtaatcaa 120

180 ttacggggtc attagttcat agccatatat ggagttccgc gttacataac ttacggtaaa 240 tggcccgcct ggctgaccgc ccaacgaccc ccgcccattg acgtcaataa tgacgtatgt 300 teceatagta aegeeaatag ggaettteea ttgaegteaa tgggtggagt atttaeggta 360 aactgcccac ttggcagtac atcaagtgta tcatatgcca agtacgcccc ctattgacgt caatgacggt aaatggcccg cctggcatta tgcccagtac atgaccttat gggactttcc 420 tacttggcag tacatctacg tattagtcat cgctattacc atggtgatgc ggttttggca 480 gtacatcaat gggcgtggat agcggtttga ctcacgggga tttccaagtc tccacccat 540 600 tgacgtcaat gggagtttgt tttggcacca aaatcaacgg gactttccaa aatgtcgtaa 660 caactccgcc.ccattgacgc aaatgggcgg taggcatgta cggtgggagg tctatataag 720 cagageteaa taaaagagee cacaaceeet cactegggge gecagteete egattgaetg 780 agtegeeegg gtaceegtgt atecaataaa ceetettgea gttgeateeg aettgtggte tegetgttee ttgggagggt eteetetgag tgattgacta eeegteageg ggggtettte 840 900 atttgggggc tcgtccggga tcgggagacc cctgcccagg gaccaccgac ccaccaccgg 960 gaggtaaget ggecageaac ttatetgtgt etgteegatt gtetagtgte tatgaetgat tttatgegee tgegteggta etagttaget aactagetet gtatetggeg gaceegtggt 1020 ggaactgacg agttcggaac acccggccgc aaccctggga gacgtcccag ggacttcggg 1080 ggccgttttt gtggcccgac ctgagtccaa aaatcccgat cgttttggac tctttggtgc 1140 1200 accccctta gaggaggat atgtggttct ggtaggagac gagaacctaa aacagttccc 1260 geeteegtet gaatttttge ttteggtttg ggaccgaage egegeegege gtettgtetg 1320 ctgcagcatc gttctgtgtt gtctctgtct gactgtgttt ctgtatttgt ctgaaaatat 1380 eggeeeggge cagactgtta ceactecett aagtttgace ttaggteact ggaaagatgt cgagcggatc gctcacaacc agtcggtaga tgtcaagaag agacgttggg ttaccttctg 1440 1500 ctctgcagaa tggccaacct ttaacgtcgg atggccgcga gaoggcacct ttaaccgaga cctcatcacc caggttaaga tcaaggtctt ttcacctggc ccgcatggac acccagacca 1560 1620 ggtcccctac atcgtgacct gggaagcctt ggcttttgac ccccctccct gggtcaagcc 1680 ctttgtacac cctaagcctc cgcctcctct tcctccatcc gccccgtctc tcccccttga acctectegt tegacecege etegatecte cetttateca geceteacte ettetetagg 1740 1800 egececcata tggccatatg agatettata tggggcaccc eegeceettg taaaetteee

1860 tgaccctgac atgacaagag ttactaacag cccctctctc caagctcact tacaggctct 1920 ctacttagtc cagcacgaag tctggagacc tctggcggca gcctaccaag aacaactgga 1980 ccgaccggtg gtacctcacc cttaccgagt cggcgacaca gtgtgggtcc gccgacacca 2040 gactaagaac ctagaacctc gctggaaagg accttacaca gtcctgctga ccaccccac 2100 cgccctcaag tagacggcat cgcagcttgg atacacgccg cccacgtgaa ggctgccgac 2160 ccegggggtg gaccatecte tagactgeeg gatetegagg gatecaceae catggaceee 2220 cattaaattg gaattegggg eecaagettt gttaaegteg aegeggeege egtegaegat 2280 aaaataaaag attttattta gtctccagaa aaagggggga atgaaagacc ccacctgtag gtttggcaag ctagcttaag taacgccatt ttgcaaggca tggaaaaata cataactgag 2340 2400 aatagagaag ttcagatcaa ggtcaggaac agatggaaca gctgaatatg ggccaaacag 2460 gatatctgtg gtaagcagtt cctgccccgg ctcagggcca agaacagatg gaacagctga 2520 atatgggcca aacaggatat ctgtggtaag cagttcctgc cccggctcag ggccaagaac agatggtccc cagatgcggt ccagccctca gcagtttcta gagaaccatc agatgtttcc 2580 2640 agggtgcccc aaggacctga aatgaccctg tgccttattt gaactaacca atcagttcgc ttctcgcttc tgttcgcgcg cttctgctcc ccgagctcaa taaaagagcc cacaacccct 2700 2760 cactegggge gecagteete egattgaetg agtegeeegg gtaecegtgt atecaataaa 2820 ccctcttgca gttgcatccg acttgtggtc tcgctgttcc ttgggagggt ctcctctgag tgattgacta cccgtcagcg ggggtctttc atttccgact tgtggtctcg ctgccttggg 2880 agggtetect etgagtgatt gactaceegt cagegggggt etteacatge ageatgtate 2940 aaaattaatt tggtttttt tcttaagtat ttacattaaa tggccatagt tgcattaatg 3000 aatoggccaa cgcgcgggga gaggcggttt gcgtattggc gctcttccgc ttcctcgctc 3060 actgactege tgegeteggt egtteggetg eggegagegg tateagetea eteaaaggeg 3120 gtaatacggt tatccacaga atcaggggat aacgcaggaa agaacatgtg agcaaaaggc 3180 cagcaaaagg ccaggaaccg taaaaaggcc gcgttgctgg cgtttttcca taggctccgc 3240 3300 ccccctgacg agcatcacaa aaatcgacgc tcaagtcaga ggtggcgaaa cccgacagga 3360 ctataaagat accaggcgtt tccccctgga agctccctcg tgcgctctcc tgttccgacc etgeegetta eeggataeet gteegeettt eteeettegg gaagegtgge gettteteat 3420 ageteaeget gtaggtatet eagtteggtg taggtegtte geteeaaget gggetgtgtg 3480 cacgaacccc ccgttcagcc cgaccgctgc gccttatccg gtaactatcg tcttgagtcc 3540

3600 aacceggtaa gacacgactt atcgccactg gcagcagcca ctggtaacag gattagcaga 3660 gcgaggtatg taggcggtgc tacagagttc ttgaagtggt ggcctaacta cggctacact 3720 agaaggacag tatttggtat ctgcgctctg ctgaagccag ttaccttcgg aaaaagagtt 3780 ggtagctctt gatccggcaa acaaaccacc gctggtagcg gtggtttttt tgtttgcaag 3840 cagcagatta cgcgcagaaa aaaaggatct caagaagatc ctttgatctt ttctacgggg 3900 tctgacgctc agtggaacga aaactcacgt taagggattt tggtcatgag attatcaaaa aggatettea cetagateet tttaaattaa aaatgaagtt tgegcaaate aatetaaagt 3960 atatatgagt aaacttggtc tgacagttac caatgcttaa tcagtgaggc acctatctca 4020 4080 gegatetgte tatttegtte atceatagtt geetgactee eegtegtgta gataactaeg 4140 atacgggagg gcttacatct ggccccagtg ctgcaatgat accgcgagac ccacgctcac 4200. cggctccaga tttatcagca ataaaccagc cagccggaag ggccgagcgc agaagtggtc ctgcaacttt atccgcctcc atccagtcta ttaattgttg ccgggaagct agagtaagta 4260 gttcgccagt taatagtttg cgcaacgttg ttgccattgc tacaggcatc gtggtgtcac 4320 gctcgtcgtt tggtatggct tcattcagct ccggttccca acgatcaagg cgagttacat 4380 4440 gatececcat gttgtgcaaa aaageggtta geteettegg teeteegate gttgtcagaa 4500 gtaagttggc cgcagtgtta tcactcatgg ttatggcagc actgcataat tctcttactg tcatgccatc cgtaagatgc ttttctgtga ctggtgagta ctcaaccaag tcattctgag 4560 aatagtgtat geggegaeeg agttgetett geeeggegte aacaegggat aataeegege 4620 4680 cacatagcag aactttaaaa gtgctcatca ttggaaaacg ttcttcgggg cgaaaactct caaggatett accgetgttg agatecagtt cgatgtaace cactegtgea eccaactgat 4740 4800 cttcagcatc ttttactttc accagcgttt ctgggtgagc aaaaacagga aggcaaaatg ccgcaaaaaa gggaataagg gcgacacgga aatgttgaat actcatactc ttcctttttc 4860 aatattattg aagcatttat cagggttatt gtctcatgac attaacctat aaaaataggc 4920 4922 gt

<sup>&</sup>lt;210> 7

<sup>&</sup>lt;211> 8282

<sup>&</sup>lt;212> DNA

<sup>&</sup>lt;213> Artificial sequence

<sup>&</sup>lt;220>

<sup>&</sup>lt;223> synthetic

<400> 7 atcacgagge cetttegtet teaagaacag etttgetett aggagtttee taatacatee 60 120 caaactcaaa tatataaagc atttgacttg ttctatgccc tagttattaa tagtaatcaa ttacggggtc attagttcat agcccatata tggagttccg cgttacataa cttacggtaa 180 atggcccgcc tggctgaccg cccaacgacc cccgcccatt gacgtcaata atgacgtatg 240 ttcccatagt aacgccaata gggactttcc attgacgtca atgggtggag tatttacggt . 300 aaactgccca cttggcagta catcaagtgt atcatatgcc aagtacgccc cctattgacg 360 tcaatgacgg taaatggccc gcctggcatt atgcccagta catgacctta tgggactttc 420 : 480 ctacttggca gtacatctac gtattagtca tegetattac catggtgatg cggttttggc agtacatcaa tgggcgtgga tagcggtttg actcacgggg atttccaagt ctccacccca 540 ttgacgtcaa tgggagtttg ttttggcacc aaaatcaacg ggactttcca aaatgtcgta 600 660 · acaactccgc cccattgacg caaatgggcg gtaggcatgt acggtgggag gtctatataa geagagetea ataaaagage ceacaacece teactegggg egecagteet eegattgact . 720 : 780 gagtegeeeg ggtaceegtg tatecaataa accetettge agttgeatee gaettgtggt ctcgctgttc cttgggaggg tctcctctga gtgattgact acccgtcagc gggggtcttt 840 catttggggg ctcgtccggg atcgggagac ccctgcccag ggaccaccga cccaccaccg. 900 960 ggaggtaagc tggccagcaa cttatctgtg tctgtccgat tgtctagtgt ctatgactga ttttatgcgc ctgcgtcggt actagttagc taactagctc tgtatctggc ggacccgtgg 1020 1080 tggaactgac gagtteggaa cacceggeeg caaccetggg agaegteeca gggaettegg gggccgtttt tgtggcccga cctgagtcca aaaatcccga tcgttttgga ctctttggtg 1140 1200 caccccctt agaggaggga tatgtggttc tggtaggaga cgagaaccta aaacagttcc egecteegte tgaatttttg ettteggttt gggacegaag eegegeegeg egtettgtet 1260 gctgcagcat cgttctgtgt tgtctctgtc tgactgtgtt tctgtatttg tctgaaaata 1320 tgggcccggg ccagactgtt accactccct taagtttgac cttaggtcac tggaaagatg 1380 tcgagcggat cgctcacaac cagtcggtag atgtcaagaa gagacgttgg gttaccttct 1440 1500 gctctgcaga atggccaacc tttaacgtcg gatggccgcg agacggcacc tttaaccgag 1560 acctcatcac ccaggttaag atcaaggtct tttcacctgg cccgcatgga cacccagacc aggteeceta categtgace tgggaageet tggettttga ecceettee tgggteaage 1620 1680 cettigtaca cectaageet cegecteete tiectecate egeccegiet etececetig

aacctecteg ttegaceeeg cetegateet eeetttatee ageceteaet eettetetag 1740 1800 gegeececat atggecatat gagatettat atggggeace ecegecectt gtaaaettee ctgaccctga catgacaaga gttactaaca gcccctctct ccaagctcac ttacaggctc 1860 1920 tctacttagt ccagcacgaa gtctggagac ctctggcggc agcctaccaa gaacaactgg 1980 accgaccggt ggtacctcac ccttaccgag tcggcgacac agtgtgggtc cgccgacacc 2040 agactaagaa cctagaacct cgctggaaag gaccttacac agtcctgctg accaccccca ccgccctcaa agtagacggc atcgcagctt ggatacacgc cgcccacgtg aaggctgccg 2100 2160 accceggggg tggaccatec tetagactge eggatetega gggatectee ecagcatgee 2220 2280 aatgacacct actcagacaa tgcgatgcaa tttcctcatt ttattaggaa aggacagtgg 2340 gagtggcacc ttccagggtc aaggaaggca cgggggaggg gcaaacaaca gatggctggc aactagaagg cacagtcgag gtctagcttg ccaaacctac aggtggggtc tttcattccc 2400 ccctttttct ggagactaaa taaaatcttt tattttatcg atagatcccg gtcggcatct 2460 actotattcc tttgccctcg gacgagtgct ggggcgtcgg tttccactat cggcgagtac 2520 ttctacacag ccatcggtcc agacggccgc gcttctgcgg gcgatttgtg tacgcccgac 2580 agtecegget eeggategga egattgegte geategacee tgegeecaag etgeateate 2640 2700 gaaattgccg tcaaccaagc tctgatagag ttggtcaaga ccaatgcgga gcatatacgc 2760 ceggageege ggegateetg caageteegg atgeeteege tegaagtage gegtetgetg 2820 ctccatacaa gccaaccacg gcctccagaa gaagatgttg gcgacctcgt attgggaatc cccgaacatc gcctcgctcc agtcaatgac cgctgttatg cggccattgt ccgtcaggac 2880 attgttggag ccgaaatccg cgtgcacgag gtgccggact tcggggcagt cctcggccca 2940 3000 aagcatcage teategagag eetgegegae ggaegeactg aeggtgtegt eeateacagt 3060 ttgccagtga tacacatggg gatcagcaat cgcgcatatg aaatcacgcc atgtagtgta 3120 ttgaccgatt cettgeggte egaatgggee gaaccegete gtetggetaa gateggeege 3180 agegategea tecatggeet eegegaeegg etgeagaaca gegggeagtt eggttteagg caggieting aacgigacae cetgigeaeg gegggagatg caataggiea ggeteteget 3240 3300 aaattcccca atgtcaagca cttccggaat cgggagcgcg gccgatgcaa agtgccgata aacataacga tetttgtaga aaccategge geagetattt accegeagga catatecaeg 3360

ccctcctaca tcgaagctga aagcacgaga ttcttcgccc tccgagagct gcatcaggtc 3420 ggagacgctg tcgaactttt cgatcagaaa cttctcgaca gacgtcgcgg tgagttcagg 3480 ctttttcatg gtattatcat cgtgtttttc aaaggaaaac cacgtccccg tggttcgggg 3540 ggcctagacg ttttttaacc tcgactaaac acatgtaaag catgtgcacc gaggccccag 3600 3660 atcagatece atacaatggg gtacettetg ggcateette ageceettgt tgaatacget 3720 tgaggagage catttgacte tttccacaac tatccaacte acaacgtgge actggggttg tgccgccttt gcaggtgtat cttatacacg tggcttttgg ccgcagaggc acctgtcgcc 3780 3840 aggtgggggg ttccgctgcc tgcaaagggt cgctacagac gttgtttgtc ttcaagaagc ttccagagga actgcttcct tcacgacatt caacagacct tgcattcctt tggcgagagg 3900 ggaaagaccc ctagactaga ccaagctttg gatttcattt.ctgaagtttg aattttctga 3960 gtcactagta atgtccttga ggatgatagt ctgaattttc tctgcaagag tacaaagatt . 4020 ggcttttttg agatctttaa tcaatgtgtc atacgcttct ttctttccat gaagttgatg 4080 ccaattacga agcagttgaa ctttctgttc tgctgtgtct tggacattgt cattcttgat 🕟 4140 ctcatctatt ttggcttcat tgacaccatt ctttcgaaca aagcctttaa cttgacttag 4200 4260 tgtcatgact ccagcaatag tggtgatata tttactcaag tcaacatcag ataaatttat 4320 tgccactgtt tcaggattta aggttggaga ttcatgagaa ccttggtttt cctttctgtg 4380 ctttctgcat gttttctgta cttcctttct cttcacccaa acaattagtg gaattggcaa 4440 aagaagaaga caaagccacc ccaaccggtt tctgggactt tgtttcctgc agtttgtatt 4500 gctggttgct gtgcatggct caagggttcc atgttcacac gaggcgcagc gaacacagtg 4560 ttcacagcca ggagaatcgc agtagaagtc tggtttgcac ttgcacttgg tattctgggt cagggtgcag tttgtttcca cttctaaacc atgctcttca tcgcagagtg tgcatcttct 4620 4680 gcatttatca gcataatggt tcttgtccat gtactccttc ccttctgtgc atggggcaca 4740 ggttggtgta cccccattca ttttgcagtc ctcaactttt tttttaccag gttggcatgg 4800 ttgacagcaa aatgggcctc cttgatataa tccttctgag cagtttttat cagtttcatg aacccgcctc ctcagcttta aactctcgga gatgctatta gtaccttgag tatgaactct 4860 taactgtgag ccagcaagca ccagaggcag gacagcccag atccacacca tggtggcttt 4920 4980 accaacagta coggaatgoc aagottgogg cogottaaga gotgtaattg aacctgggag 5040 tggacacctg tggagagaaa ggcaaagtgg atgtcagtaa gaccaatagg tgcctatcag 5100 aaacgcaaga gtcttctctg tctcgacaag cccagtttct attggtctcc ttaaacctgt

cttgtaacct tgatacttac ctgcccagtg cctcacgacc aacttctgca ggaattcctg 5160 gacageteee agatgateag taacegtggt tgttatttet gtgeegggea gtggageetg 5220 5280 ggtaggggga gctctgcctc agtgctttca gctaaaaatg gggtgggaac ccccaggagg 5340 cccgggccgc cctggaagtt cccttttctc tctgttcttg ggaagtcgat tgagcaacag 5400 cgggggtcag gtgaggctcc ttcactaccg atgcacaccg agtgctgggg gaggttctct teteteteag geceaaceee agggeeeetg cetaggteee ggaeteteae tettgaegea 5460 tgcgtggctt ggtggtccca gtcagcaaac ttggggtccc gttgcctggg aaagggagag 5520 5580 ggtactgggc atcgacgcct ctgcttccac gaaagccttg tgaagaaagg atggggggcgc ttttgtgcag gagaatgagg cgcactgagg tgaactggcc ctcgggggcg cgtgtcccag 5640 5700 atgtgtgtgc agggcctcct gatggccgca gccctcgtcc ctgtgacccg cttggagctg 5760 gcaccetgag tggtggcete acettgtact cacteceagg teactgteet egacgeggee 5820 gctcgacgat aaaataaaag attttattta gtctccagaa aaagggggga atgaaagacc ccacctgtag gtttggcaag ctagcttaag taacccattt tgcaaggcat ggaaaaatac 5880 5940 ataactgaga atagagaagt tcagatcaag gtcggaacag atggaacagg caataaaaga 6000 geocacaace ceteactegg ggegecagte etcegattga etgagtegee egggtaceeg 6060 tgtatccaat aaaccctctt gcagttgcat ccgacttgtg gtctcgctgt tccttgggag ggtctcctct gagtgattga ctacccgtca gcgggggtct ttcacatgca gcatgtatca 6120 aaattaattt ggttttttt cttaagtatt tacattaaat ggccatagtt tcgtaatcat 6180 6240 ggtcatagct gtttcctgtg tgaaattgtt atccgctcac aattccacac aacatacgag ccggaagcat aaagtgtaaa gcctggggtg cctaatgagt gagctaactc acattaattg 6300 6360 cgttgcgctc actgcccgct ttccagtcgg gaaacctgtc gtgccagctg cattaatgaa 6420 teggecaacg egegggaga ggeggtttge gtattgggeg etetteeget teetegetea 6480 etgacteget gegeteggte gtteggetge ggegageggt ateageteae teaaaggegg 6540 taatacggtt atccacagaa tcaggggata acgcaggaaa gaacatgtga gcaaaaggcc 6600 agcaaaaggc caggaaccgt aaaaaggccg cgttgctggc gtttttccat aggctccgcc 6660 cccctgacga gcatcacaaa aatcgacgct caagtcagag gtggcgaaac ccgacaggac tataaagata ccaggogttt ccccctggaa gctccctcgt gcgctctcct gttccgaccc 6720 6780 tgccgcttac cggatacctg tccgcctttc tcccttcggg aagcgtggcg ctttctcata

6840 geteacgetg taggtatete agtteggtgt aggtegtteg etecaagetg ggetgtgtge 6900 acgaaccccc cgttcagccc gaccgctgcg ccttatccgg taactatcgt cttgagtcca accoggtaag acacgactta togccactgg cagcagccac tggtaacagg attagcagag 6960 cgaggtatgt aggcggtgct acagagttct tgaagtggtg gcctaactac ggctacacta 7020 7080 gaaggacagt atttggtatc tgcgctctgc tgaagccagt taccttcgga aaaagagttg gtagetettg ateeggeaaa caaaceaceg etggtagegg tggttttttt gtttgcaage 7140 7200 agcagattac gegcagaaaa aaaggatctc aagaagatcc tttgatcttt tctacggggt 7260 ctgacgctca gtggaacgaa aactcacgtt aagggatttt ggtcatgaga ttatcaaaaa ggatetteae etagateett ttaaattaaa aatgaagttt gegeaaatea atetaaagta 7320 tatatgagta aacttggtct gacagttacc aatgcttaat cagtgaggca cctatctcag 7380 egatetgtet atttegttea tecatagttg cetgaetece egtegtgtag ataactaega 7440 tacgggaggg cttaccatct ggccccagtg ctgcaatgat accgcgagac ccacgctcac 7500 7560 cggctccaga tttatcagca ataaaccagc cagccggaag ggccgagcgc agaagtggtc 7620 ctgcaacttt atccgcctcc atccagtcta ttaattgttg ccgggaaget agagtaagta 7680 gttegecagt taatagtttg egeaacgttg ttgecattge tacaggeate gtggtgteae gctcgtcgtt tggtatggct tcattcagct ccggttccca acgatcaagg cgagttacat 7740 7800 gatececcat gttgtgcaaa aaageggtta geteettegg teeteegate gttgteagaa 7860 gtaagttggc cgcagtgtta tcactcatgg ttatggcagc actgcataat tctcttactg tcatgccatc cgtaagatgc ttttctgtga ctggtgagta ctcaaccaag tcattctgag 7920 aatagtgtat geggegaeeg agttgetett geeeggegte aacaegggat aataeegege 7980 cacatagcag aactttaaaa gtgctcatca ttggaaaacg ttcttcgggg cgaaaactct 8040 caaggatett accgetgttg agatecagtt egatgtaace caetegtgea eccaactgat 8100 cttcagcatc ttttactttc accagcgttt ctgggtgagc aaaaacagga aggcaaaatg 8160 8220 ccgcaaaaaa gggaataagg gcgacacgga aatgttgaat actcatactc ttcctttttc aatattattg aagcatttat cagggttatt gtctcatgac attaacctat aaaaataggc 8280 8282 gt

<sup>&</sup>lt;210> 8

<sup>&</sup>lt;211> 8345

<sup>-2125</sup> DNA

<sup>&</sup>lt;213> Artificial sequence

## <220>

## <223> synthetic

<400> atcacgaggc cctttcgtct tcaagaacag ctttgctctt aggagtttcc taatacatcc 60 caaactcaaa tatataaagc atttgacttg ttctatgccc tagttattaa tagtaatcaa 120 ttacggggtc attagttcat agcccatata tggagttccg cgttacataa cttacggtaa 180 atggcccgcc tggctgaccg cccaacgacc cccgcccatt gacgtcaata atgacgtatg 240 ttcccatagt aacgccaata gggactttcc attgacgtca atgggtggag tatttacggt 300 aaactgccca cttggcagta catcaagtgt atcatatgcc aagtacgccc cctattgacg 360. tcaatgacgg taaatggccc gcctggcatt atgcccagta catgacctta tgggactttc 420 ctacttggca gtacatctac gtattagtca tcgctattac catggtgatg cggttttggc 480 agtacatcaa tgggcgtgga tagcggtttg actcacgggg atttccaagt ctccacccca 540 ttgacgtcaa tgggagtttg ttttggcacc aaaatcaacg ggactttcca aaatgtcgta 600 acaactccgc cccattgacg caaatgggcg gtaggcatgt acggtgggag gtctatataa 660 gcagagetea ataaaagage ecacaacece teactegggg egecagteet eegattgact 720 780 gagtcgcccg ggtacccgtg tatccaataa accctcttgc agttgcatcc gacttgtggt ctegetgtte cttgggaggg teteetetga gtgattgaet accegteage gggggtettt 840 catttggggg ctcgtccggg atcgggagac ccctgcccag ggaccaccga cccaccaccg 900 ggaggtaagc tggccagcaa cttatctgtg tctgtccgat tgtctagtgt ctatgactga 960 ttttatgege etgegteggt actagttage taactagete tgtatetgge ggaecegtgg 1020 1080 tggaactgac gagttcggaa cacccggccg caaccctggg agacgtccca gggacttcgg gggccgtttt tgtggcccga cctgagtcca aaaatcccga tcgttttgga ctctttggtg 1140 caccccctt agaggaggga tatgtggttc tggtaggaga cgagaaccta aaacagttcc 1200 egecteegte tgaatttttg ettteggttt gggacegaag eegegeegeg egtettgtet 1260 gctgcagcat cgttctgtgt tgtctctgtc tgactgtgtt tctgtatttg tctgaaaata 1320 tgggcccggg ccagactgtt accactccct taagtttgac cttaggtcac tggaaagatg 1380 tegageggat egeteacaac cagteggtag atgteaagaa gagaegttgg gttacettet 1440 getetgeaga atggeeaace tttaacgteg gatggeegeg agaeggeace tttaacegag 1500 acctcatcac ccaggttaag atcaaggtct tttcacctgg cccgcatgga cacccagacc 1560

aggtccccta catcgtgacc tgggaagcct tggcttttga ccccctccc tgggtcaagc 1620 1680 cettigtaca cectaagect eegecteete tieeteeate egeceegtet etececetig aaceteeteg ttegaeeeeg cetegateet eeetttatee ageeeteaet eettetetag 1740 gegeeecat atggeeatat gagatettat atggggeace eeegeeectt gtaaaettee 1800 ctgaccetga catgacaaga gttactaaca geceetetet ecaageteac ttacaggete 1860 tctacttagt ccagcacgaa gtctggagac ctctggcggc agcctaccaa gaacaactgg 1920 1980 accgaccggt ggtacctcac ccttaccgag tcggcgacac agtgtgggtc cgccgacacc 2040 agactaagaa cctagaacct cgctggaaag gaccttacac agtcctgctg accaccccca ccgccctcaa agtagacggc atcgcagctt ggatacacgc cgcccacgtg aaggctgccg 2100 acceeggggg tggaceatec tetagactge eggatetega gggatectee ceageatgee 2160 2220 2280 aatgacacct actcagacaa tgcgatgcaa tttcctcatt ttattaggaa aggacagtgg 2340 gagtggcacc ttccagggtc aaggaaggca cgggggaggg gcaaacaaca gatggctggc 2400 aactagaagg cacagtcgag gtctagcttg ccaaacctac aggtggggtc tttcattccc 2460 ccctttttct ggagactaaa taaaatcttt tattttatcg atagatcccg gtcggcatct actitattice tittgeceteg gaegagtget ggggegtegg titteeactat eggegagtae 2520 2580 ttctacacag ccatcggtcc agacggccgc gcttctgcgg gcgatttgtg tacgcccgac 2640 agtecegget ceggategga egattgegte geategacee tgegeecaag etgeateate 2700 gaaattgccg tcaaccaagc tctgatagag ttggtcaaga ccaatgcgga gcatatacgc ceggageege ggegateetg caageteegg atgeeteege tegaagtage gegtetgetg 2760 ctccatacaa gccaaccacg gcctccagaa gaagatgttg gcgacctcgt attgggaatc 2820 cccgaacatc gcctcgctcc agtcaatgac cgctgttatg cggccattgt ccgtcaggac 2880 2940 attgttggag ccgaaatccg cgtgcacgag gtgccggact tcggggcagt cctcggccca 3000 aagcatcagc tcatcgagag cctgcgcgac ggacgcactg acggtgtcgt ccatcacagt 3060 ttgccagtga tacacatggg gatcagcaat cgcgcatatg aaatcacgcc atgtagtgta ttgaccgatt ccttgeggtc cgaatgggcc gaaccegctc gtctggctaa gateggccgc 3120 agcgatcgca tccatggcct ccgcgaccgg ctgcagaaca gcgggcagtt cggtttcagg 3180 caggitetige aacgigacae cetgigeaeg gegggagatg caataggica ggeteteget 3240 aaattcccca atgtcaagca cttccggaat cgggagcgcg gccgatgcaa agtgccgata 3300

aacataacga tetttgtaga aaccategge geagetattt aecegeagga catateeacg 3360 3420 ccetectaca tegaagetga aageaegaga ttettegeee teegagaget geateaggte ggagacgctg tcgaactttt cgatcagaaa cttctcgaca gacgtcgcgg tgagttcagg 3480 3540 ctttttcatg gtattatcat cgtgtttttc aaaggaaaac cacgtccccg tggttcgggg ggcctagacg ttttttaacc tcgactaaac acatgtaaag catgtgcacc gaggccccag 3600 atcagatece atacaatggg gtacettetg ggcatectte ageceettgt tgaatacget 3660 3720 tgaggagage catttgactc tttccacaac tatccaactc acaacgtggc actggggttg tgccgccttt gcaggtgtat cttatacacg tggcttttgg ccgcagaggc acctgtcgcc 3780 aggtgggggg ttccgctgcc tgcaaagggt cgctacagac gttgtttgtc ttcaagaagc 3840 ttccagagga actgcttcct tcacgacatt caacagacct tgcattcctt tggcgagagg 3900 ggaaagaccc ctagactaga ccaagctttg gatttcattt ctgaagtttg aattttctga 3960 gtcactagta atgtccttga ggatgatagt ctgaattttc tctgcaagag tacaaagatt 4020 ggcttttttg agatctttaa tcaatgtgtc atacgcttct ttctttccat gaagttgatg 4080 ccaattacga agcagttgaa ctttctgttc tgctgtgtct tggacattgt cattcttgat 4140 ctcatctatt ttggcttcat tgacaccatt ctttcgaaca aagcctttaa cttgacttag 4200 tgtcatgact ccagcaatag tggtgatata tttactcaag tcaacatcag ataaatttat 4260 tgccactgtt tcaggattta aggttggaga ttcatgagaa ccttggtttt cctttctgtg 4320 4380 ctttctgcat gttttctgta cttcctttct cttcacccaa acaattagtg gaattggcaa aagaagaaga caaagccacc ccaaccggtt tecggteecc tteactgage caeggggeeg 4440 acaatcttct ggtctctggg gctgagatgt cccggtaggg tgcacaggtg agggagttcg 4500 4560 cagcactggc ttggtagtag tagagttcac tttctgaagg actggcacga cagaactgaa gtacatcacc gagttgctga tgactgagca gaaatagtag ccttcgtttt ccttgctgaa 4620 4680 cttgttcagg gtgagaacgt acttattatt cgtgtccctc atggcagaaa acagtttcga cgaattcagc ttctcgtccc acgttatctt gttgtgggat gaagccatat agacaacgaa 4740 4800 ggtgggctgg gggagtttgg agctggagtt ctggaagagc caagagcatc cttgcgaaac 4860 ggaccccaac acttcacata ccaggtccac cttctgacca agttcggcgt ccattttctt 4920 tggaaagatt cggagttcgg gtgcctgtgg cttagcttct ccactcccca ggataatcga 4980 ctcacccagc agcagcaggt tcagcgacag aaagcgggtc aacggtgagg ccatggtggc

tttaccaaca gtaccggaat gccaagcttg cggccgctta agagctgtaa ttgaacctgg 5040 5100 gagtggacac ctgtggagag aaaggcaaag tggatgtcag taagaccaat aggtgcctat 5160 cagaaacgca agagtettet etgtetegae aageceagtt tetattggte teettaaace tgtcttgtaa ccttgatact tacctgccca gtgcctcacg accaacttct gcaggaattc 5220 ctggacaget eccagatgat cagtaacegt ggttgttatt tetgtgeegg geagtggage 5280 ctgggtaggg ggagctctgc ctcagtgctt tcagctaaaa atggggtggg aacccccagg 5340 5400 aggeeeggge egeeetggaa gtteeetttt etetetgtte ttgggaagte gattgageaa cageggggt caggtgaggc teetteacta cegatgeaca cegagtgetg ggggaggtte 5460 tettetetet caggeccaac eccagggece etgectaggt eccggaetet cactettgae. 5520 5580 gcatgcgtgg cttggtggtc ccagtcagca aacttggggt cccgttgcct gggaaaggga 5640 gagggtactg ggcatcgacg cctctgcttc cacgaaagcc ttgtgaagaa aggatggggg cgcttttgtg caggagaatg aggcgcactg aggtgaactg gccctcgggg gcgcgtgtcc 5700 5760 cagatgtgtg tgcagggect cetgatggec gcageceteg tecetgtgac cegettggag ctggcaccct gagtggtggc ctcaccttgt actcactccc aggtcactgt cctcgacgcg 5820 gccgctcgac gataaaataa aagattttat ttagtctcca gaaaaagggg ggaatgaaag 5880 5940 accecacety taggettegge aagetagett aagtaaceca tettgeaagg catggaaaaa tacataactg agaatagaga agttcagatc aaggtcggaa cagatggaac aggcaataaa 6000 agageceaca acceeteact eggggegeea gteeteegat tgaetgagte geeegggtae 6060 ccgtgtatcc aataaaccct cttgcagttg catccgactt gtggtctcgc tgttccttgg 6120 6180 gagggtetee tetgagtgat tgaetaeeeg teageggggg tettteaeat geageatgta 6240 tcaaaattaa tttggttttt tttcttaagt atttacatta aatggccata gtttcgtaat 6300 catggtcata gctgtttcct gtgtgaaatt gttatccgct cacaattcca cacaacatac gagccggaag cataaagtgt aaagcctggg gtgcctaatg agtgagctaa ctcacattaa 6360 6420 ttgcgttgcg ctcactgccc gctttccagt cgggaaacct gtcgtgccag ctgcattaat 6480 gaateggeea aegegegggg agaggeggtt tgegtattgg gegetettee getteetege teactgacte getgegeteg gtegttegge tgeggegage ggtateaget cacteaaagg 6540 6600 cggtaatacg gttatccaca gaatcagggg ataacgcagg aaagaacatg tgagcaaaag 6660 gccagcaaaa ggccaggaac cgtaaaaagg ccgcgttgct ggcgtttttc cataggctcc gececetga egageateae aaaaategae geteaagtea gaggtggega aaceegaeag 6720

gactataaag ataccaggeg tttccccctg gaageteect egtgegetet cetgtteega 6780 6840 ccctgccgct taccggatac ctgtccgcct ttctcccttc gggaagcgtg gcgctttctc 6900 atageteacg etgtaggtat etcagttegg tgtaggtegt tegeteeaag etgggetgtg tgcacgaacc ccccgttcag cccgaccgct gcgccttatc cggtaactat cgtcttgagt 6960 7020 ccaacceggt aagacacgae ttategeeae tggcageage caetggtaae aggattagea. 7080 gagcgaggta tgtaggcggt gctacagagt tcttgaagtg gtggcctaac tacggctaca ctagaaggac agtatttggt atctgcgctc tgctgaagcc agttaccttc ggaaaaagag 7140 7200 . ttggtagete ttgateegge aaacaaacca cegetggtag eggtggtttt tttgtttgea agcagcagat tacgcgcaga aaaaaaggat ctcaagaaga tcctttgatc ttttctacgg 7260 \* ggtctgacgc tcagtggaac gaaaactcac gttaagggat tttggtcatg agattatcaa 7320 -7380 . aaaggatett cacetagate ettttaaatt aaaaatgaag tttgegeaaa teaatetaaa 7440 gtatatatga gtaaacttgg tctgacagtt accaatgctt aatcagtgag gcacctatct 7500 cagogatetg tetatttegt teatecatag ttgeetgaet eccegtegtg tagataacta 7560 cgatacggga gggcttacca tctggcccca gtgctgcaat gataccgcga gacccacgct caccggctcc agatttatca gcaataaacc agccagccgg aagggccgag cgcagaagtg 7620 7680 gtcctgcaac tttatccgcc tccatccagt ctattaattg ttgccgggaa gctagagtaa 7740 gtagttegee agttaatagt ttgegeaacg ttgttgeeat tgetacagge ategtggtgt 7800 cacgctcgtc gtttggtatg gcttcattca gctccggttc ccaacgatca aggcgagtta 7860 catgatecee catgttgtgc aaaaaagegg ttageteett eggteeteeg ategttgtea gaagtaagtt ggccgcagtg ttatcactca tggttatggc agcactgcat aattctctta 7920 7980 ctgtcatgcc atccgtaaga tgcttttctg tgactggtga gtactcaacc aagtcattct 8040 gagaatagtg tatgeggega eegagttget ettgeeegge gteaacaegg gataataeeg 8100 cgccacatag cagaacttta aaagtgctca tcattggaaa acgttcttcg gggcgaaaac 8160 tctcaaggat cttaccgctg ttgagatcca gttcgatgta acccactcgt gcacccaact gatetteage atetttaet tteaceageg tttetgggtg ageaaaaaca ggaaggeaaa 8220 atgccgcaaa aaagggaata agggcgacac ggaaatgttg aatactcata ctcttccttt 8280 ttcaatatta ttgaagcatt tatcagggtt attgtctcat gacattaacc tataaaaata 8340 8345 ggcgt

<210> 9 <211> 61 <212> PRT <213> Artificial sequence <220> <223> coiled-coil presentation structure <400> 9 Met Gly Cys Ala Ala Leu Glu Ser Glu Val Ser Ala Leu Glu Ser Glu Val Ala Ser Leu Glu Ser Glu Val Ala Ala Leu Gly Arg Gly Asp Met 20 25 Pro Leu Ala Ala Val Lys Ser Lys Leu Ser Ala Val Lys Ser Lys Leu 40 Ala Ser Val Lys Ser Lys Leu Ala Ala Cys Gly Pro Pro 55 <210> 10 <211> 6 <212> PRT <213> Artificial sequence <220> <223> looped structure of coiled-coil presentation structure <400> 10 Gly Arg Gly Asp Met Pro <210> 11 <211> 69 <212> PRT <213> Artificial sequence <220> <223> minibody presentation structure <400> 11 Met Gly Arg Asn Ser Gln Ala Thr Ser Gly Phe Thr Phe Ser His Phe 10

Tyr Met Glu Trp Val Arg Gly Glu Tyr Ile Ala Ala Ser Arg His

Tyr Ile Val Ser Arg Asp Thr Ser Gln Ser Ile Leu Tyr Leu Gln Lys 55 Lys Lys Gly Pro Pro <210> 12 <211> 7 <212> PRT <213> Simian virus 40 <400> 12 Pro Lys Lys Lys Arg Lys Val <210> 13 <211> 6 <212> PRT <213> Homo sapiens <400> 13 Ala Arg Arg Arg Pro <210> 14 <211> 10 <212> PRT <213> Mus musculus <400> 14 Glu Glu Val Gln Arg Lys Arg Gln Lys Leu 5 10 <210> 15 <211> 9 <212> PRT <213> Mus musculus

<400> 15

Glu Glu Lys Arg Lys Arg Thr Tyr Glu

Lys His Asn Lys Tyr Thr Thr Glu Tyr Ser Ala Ser Val Lys Gly Arg

```
<210> 16
 <211> 20
 <212> PRT
 <213> Xenopus laevis
 <400> 16
 Ala Val Lys Arg Pro Ala Ala Thr Lys Lys Ala Gly Gln Ala Lys Lys .
 Lys Lys Leu Asp
 <210> 17
 <211> 10
 <212> PRT
 <213> Artificial sequence
 <220>
 <223> stability sequence
 <220>
 <221> MISC_FEATURE
 <222> (3)..(6)
 <223> "Xaa" at positions 3 to 6 can be any amino acid.
 <400> 17
 Met Gly Xaa Xaa Xaa Gly Gly Pro Pro
              5
 <210> 18
 <211> 5
 <212> PRT
 <213> Artificial sequence
 <220>
 <223> linker sequence
 <400> 18
 Gly Ser Gly Gly Ser
<210> 19
 <211> 4
 <212> PRT
 <213> Artificial sequence
 <220>
```

<223> linker sequence

<400> 19 Gly Gly Gly Ser